

Serial No.: 10/617,859
Applicant: HIBST et al.

REMARKS:

ELECTION/RESTRICTIONS

Applicants acknowledge, with appreciation, withdrawal of the restriction requirement.

REMARKS REGARDING CLAIMS AMENDMENTS:

Claim 5 has been amended and claim 7 canceled to overcome objection to these claims to place the present application in condition for allowance. Claims 1 - 6 and 8 - 11 are pending in the present application.

IN RESPONSE TO THE OFFICE ACTION:

Applicants have considered the Examiner's selection of references including Popova et al.; Monnier et al. and Srednev et al. but respectfully disagree that the references, either alone or in combination, meet the teaching requirements for rejection of claims of the present invention under 35 U.S.C. §103. Evidence in support of this position will be presented following summaries of teachings of references relied upon by the Examiner.

SUMMARIES OF THE REFERENCES

It is difficult from the Office Action to identify which reference, if any, represents a primary reference lacking teachings to be found in the other cited references. This response treats Popova et al. as the primary reference that relies upon Monnier et al. and Srednev et al. to supply needed teachings.

POPOVA ET AL. (Kinetics and Catalysis, Vol. 6, P856 1965)

Popova et al. teaches oxidation of n-butenes using a copper oxide catalyst for production of a butadiene radical (p. 859, top of page). The reference further teaches a process for producing crotonaldehyde from n-butenes. However, Popova et al. uses only a copper oxide catalyst. There is no teaching to add a second oxidation catalyst and Popova et al. fails to suggest

Serial No.: 10/617,859
Applicant: HIBST et al.

either a further isomerization catalyst or the use of a structured catalyst bed having part beds defined for containment of different types of catalyst.

MONNIER ET AL. (United States Patent No. 4,942,263)

Monnier et al. describes a process for producing crotonaldehyde from 1,3-butadiene, using a silver catalyst that may be loaded on an acidic alumina support at a loading level from about 0.5 up to 50 weight percent. Monnier et al. emphasizes (see e.g. the patent abstract) that all compounds, oxidized according to the disclosed process, need to be free of allylic hydrogen. Since butenes comprise allylic hydrogen they would be unsuitable as starting materials, according to the teachings of Monnier et al. The reference is silent concerning a structured catalyst bed and makes no suggestion of a further isomerization step to increase product yield.

SREDNEV ET AL. (Russ. J. Org. Chem. Vol. 34, No. 7, 1998 pp. 968 - 970)

Srednev et al. teaches the rearrangement of 3,4-epoxy-1-butene (vinylloxirane) over lithium phosphate. The 3,4-epoxy-1-butene used in this reference results from oxidation of 1,3-butadiene with organic hydroperoxides. As stated in the specification of the present application at page 3, lines 33 - 35, the process of Srednev is carried out in the liquid phase and not in the gas phase. As with the references of Popova et al. and Monnier et al., previously summarized, Srednev et al. is silent regarding the use of a structured catalyst bed including individual part beds.

CLAIMS REJECTIONS - 35 USC §103

The Office Action indicates rejection of claims 1 - 8 under 35 U.S.C. 103(a) as being unpatentable over Popova et al. (Kinetics and Catalysis, 1965), Monnier et al. (U.S. 4,942,263) and Srednev et al. (Russ. J. Org. Chem. 1998).

Particulars of the rejection are included for convenient reference and further discussion as follows:

The instant claims are drawn to a structured catalyst bed comprising at least one catalytically active part bed comprising silver, and alkali metal and a porous support material, and, at least one catalytically active part bed comprising an alkali metal phosphate and at least one sheet silicate. Further limitations include the structured

Serial No.: 10/617,859
Applicant: HIBST et al.

catalyst bed further comprising a catalytically active part bed comprising at least a mixture of oxides of the main group metals and transition metals.

Discussion of differences between the present invention and cited references includes a table providing requirements of claims of the present invention compared with teachings from the references of Popova et al. (Kinetics and Catalysis, 1965), Monnier et al. (U.S. 4,942,263) and Srednev et al. (Russ. J. Org. Chem. 1998) as follows:

Comparison of the present invention with teachings of the references

| Claims Requirements of the Present Invention | Popova et al.; Srednev et al. and Monnier et al. |
|--|--|
| Claim 1 recites "A structured catalyst bed which comprises at least the following part beds:" | The references of Popova et al.; Srednev et al. and Monnier et al. all fail to teach a structured catalyst bed. It appears that without clear justification the Examiner adopts the position that one of ordinary skill in the art would readily adopt such a structured bed. |
| Claim 1 recites "(II) at least one catalytically active part bed comprising at least silver, an alkali metal and a porous support material;" | Monnier et al. (U.S. 4,942,263) uses a silver catalyst that may be loaded on an acidic alumina support at a loading level from about 0.5 up to 50 weight percent (see Col. 4, lines 25 - 65). Especially preferred catalysts use a promoter (see Col. 5, lines 20 - 36). Monnier et al. teaches (Col. 10, lines 26 - 31), "that catalysts comprising silver on high surface area, activated alumina readily and selectively produce crotonaldehyde from 1,3 butadiene. |
| Claim 1 further recites "and (III) at least one catalytically active part bed comprising at least one alkali metal phosphate and at least one sheet silicate." | Srednev et al. teach the isomerization of 3,4-epoxy-1-butene over lithium phosphate in a temperature range from 280°C to 310°C. This temperature range is essentially above the range used for the present invention. The reference does not teach the use of lithium phosphate in the form of a supported catalyst. |

Serial No.: 10/617,859
Applicant: HIBST et al.

The Examiner correctly states that, "The instant claims are drawn to a structured catalyst bed - -." However, the Office Action does not appear to address the claimed invention of such a structured catalyst bed, but applies references that teach catalyzed chemical reactions for production of butadiene radicals from n-butenes and crotonaldehyde from 1,3-butadiene.

It seems that impermissible hindsight vision influenced examination of claims of the present invention due to the Examiner's knowledge of the invention. The Office Action contains evidence of this in the Examiner's statement on page 3, second paragraph (emphasis added), as follows:

" - - - the examiner takes the position that it would have been obvious to a person of ordinary skill in the art; therefore, to combine the catalysts taught in the individual references into one catalyst bed, or rather a series of catalyst bed(s), to be used in a single reactor, i.e., in fixed bed."

It appears that the Examiner's position shifts from a first position alleging the obviousness of "combining the catalysts - - into one catalyst bed" to a second position having distribution of the catalysts in "a series of catalyst beds." The latter position is closer to the structured catalyst of claim 1 of the present invention, suggesting the possibility of recognition, in hindsight, that "one catalyst bed" failed to effectively describe the claims language of the present invention.

Referring now particularly to claim 1 of the present invention, shown below for convenient reference:

1. A structured catalyst bed which comprises at least the following part beds:
 - (II) at least one catalytically active part bed comprising at least silver, an alkali metal and a porous support material; and
 - (III) at least one catalytically active part bed comprising at least one alkali metal phosphate and at least one sheet silicate.

The rejection under 35 U.S.C. §103(a) does not include references addressing the subject matter of claim 1, recited in the preamble as "A structured catalyst bed." The structured catalyst bed comprises at least two part beds including, "(II) at least one catalytically active part bed comprising at least silver, an alkali metal and a porous support material." The second part bed requires, "(III) at least one catalytically active part bed comprising at least one alkali metal phosphate and at least one sheet silicate." Claim 1, although identifying catalysts, addresses the form of the catalyst structure rather than its particular constituents.

Serial No.: 10/617,859
Applicant: HIBST et al.

None of the references of Popova et al.; Monnier et al; and Srednev et al. teach a mixed catalyst bed or a structured catalyst bed according to claims of the present invention. The lack of teaching of the references exists whether considered individually or in combination. For this reason the present invention is unobvious over the references because they omit a key requirement of the present invention and thereby fail to teach all the limitations of the claims.

According to MPEP Section 706.02(j), a proper rejection of claims under 35 USC §103 should contain points A - D, discussed as follows:

(A) the relevant teachings of the prior art relied upon, preferably with reference to the relevant column or page number(s) and line number(s) where appropriate:

Application of this requirement appears to be missing from the Office Action because cited references neither teach nor suggest the claimed subject matter, which relates to a structure including part beds, each containing a catalyst composition. The claimed subject matter is a "structured catalyst bed," regardless of the fact that catalytic materials are common to both the references and the present invention.

(B) the difference or differences in the claim over the applied reference(s):

The Office Action does not appear to address this requirement.

(C) the proposed modification of the applied reference(s) necessary to arrive at the claimed subject matter:

The Office Action contained no suggestions for modifying teachings of the references to arrive at subject matter recited in claims of the present invention. Based upon similarity of catalytic materials, it appears the Examiner took the position that it would be obvious to combine catalysts from the references to produce the structured catalyst bed of the present invention even though the Office Action provides neither evidence supportive of the Examiner's position nor references suggesting that separate catalyst systems could be combined to provide a structured, multipart catalyst bed according to the present invention.

and (D) an explanation why one of ordinary skill in the art at the time the invention was made would have been motivated to make the proposed modification:

It appears that, based upon the teachings of the references, one of ordinary skill in the art would not arrive at the structured catalyst bed of claim 1 or claims 2 - 8 depending therefrom.

Serial No.: 10/617,859
Applicant: HIBST et al.

The Examiner has admitted in the Office Action on page 3, second paragraph that the teachings of the references, discussed previously, could motivate "a person of ordinary skill in the art; therefore, to combine the catalysts taught in the individual references into one catalyst bed, - - - ." There are no teachings in the references suggesting a structured catalyst bed as described in the present application.

In view of the above, applicants submit that the requirement and burden of presenting of a *prima facie* case of obviousness under 35 USC §103 has not been met. Applicants further submit that extensive discussion of references relied upon by the Examiner on page 2, line 36 to page 3 line 35 of the present application shows their lack of relevance to the claimed subject matter. Therefore, applicants request reconsideration and withdrawal of the rejection of claims 1 - 6 and 8 under 35 USC §103(a). Claim 7 was cancelled.

In rejecting claims 9 - 11 under 35 U.S.C. 103(a) as being unpatentable over Popova et al. (Kinetics and Catalysis, 1965), Monnier et al. (U.S. 4,942,263) and Srednev et al. (Russ. J. Org. Chem. 1998), the Office Action states that, "The instant claims are drawn to a process of preparing crotonaldehyde from C₄-mono-olefins or di-olefins using the structured catalyst bed of the present invention." (emphasis added).

For the reasons discussed previously, the cited references fail to teach the claimed subject matter of "a structured catalyst bed." The process of claim 9, and claims 10 and 11 depending therefrom, requires the structured catalyst bed described and claimed by the present application. The present invention is unobvious and claims 9 - 11 should be patentable over the references.

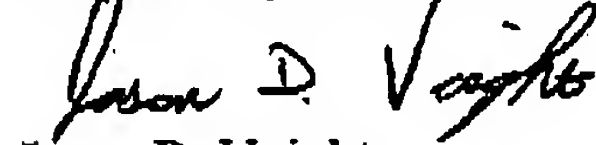
Given the above, applicants request that the rejection of claims 9 - 11 under 35 U.S.C. §103(a) be reconsidered and withdrawn.

Applicants have made an earnest attempt to respond to all the points included in the Office Action and, in view of the above, submit that the requirement and burden of presenting of a *prima facie* case of obviousness under 35 USC §103 have not been fulfilled. Amendment of claims places the application in condition for allowance. Consequently, request is respectfully made for reconsideration of the application and notification of allowance of all pending claims including amended claim 5 and original claims 1 - 4, 6 and 8 - 11 in the next paper from the Office.

Serial No.: 10/617,859
Applicant: HIBST et al.

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Respectfully submitted,



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